

**REMARKS**

Reconsideration and allowance of this application are respectfully requested.

By the present response, claims 20-23 have been added. Thus, claims 1-23 remain pending.

Support for the present claim amendments can be found, for example, in at least the following portions of the disclosure: the original claims, Figures 2a-2c, and the specification, paragraphs [0018] - [0020], and [0023] - [0024].

***ALLOWABLE SUBJECT MATTER***

Applicants note with appreciation the indication of allowable subject matter in objected claims 4, 17 and 18.

***CLAIM REJECTIONS UNDER 35 U.S.C. §103***

Claims 1, 2, 3, 5, 6-10, 13-16 and 19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,196,088 to Nemec (hereafter "*Nemec*") in view of commonly assigned WO 00/18583 to Trovinger et al. (hereafter "*Trovinger et al.*") on the grounds set forth at paragraph 2 of the Official Action. Reconsideration of this rejection is respectfully requested.

Exemplary embodiments of the present invention are directed to folding sheet material and to a sheet folding apparatus using a pinch foot, fold rollers and a fold blade. Figs. 1 illustrates an exemplary apparatus for folding sheet material 100.

The exemplary apparatus 100 includes a fold blade 104 having a longitudinal axis along the X-axis of Figure 1A. The fold blade 104 can be fixed or can alternatively be movable. The apparatus 100 also includes two fold rollers, shown in Figure 2A as two fold rollers 206, but can alternatively be of any number. In further reference to the exemplary embodiment of Figure 2A, the fold blade 204 is positioned in a plane which passes between the two fold rollers 206. Exemplary fold roller 206 rotates about an axis parallel to a longitudinal axis of the fold blade. The fold roller 206 can be a single fold roller or it can be multiple sub rollers having a cumulative length of at least the length of a desired fold. The apparatus further includes a pinch foot 220 elastically mounted in a housing 202. The fold rollers 206 can also be mounted in the housing 202.

In operation, sheet material is fed into an area between the two fold rollers and the fold blade. The sheet material is clamped against the fold blade with the pinch foot. A drive means moves the fold roller and the fold blade relative to one another. This motion forms a fold in the sheet as the fold blade is placed in operative communication with the fold rollers. The fold rollers rotate about an axis parallel to the longitudinal axis of the fold blade during insertion of the fold blade and rotate in a reverse direction when the fold blade and the folded sheet are removed from between the fold rollers. Concurrently, the pinch foot maintains the clamping of the sheet material against the fold blade as it is retracted into the housing. Retraction is along an axis perpendicular to the sheet material and parallel to the direction of relative motion between the fold blade and the fold rollers. The clamping of the sheet material by the pinch foot during the relative movement of the fold blade and the fold rollers assists in precision placement of the fold in the sheet material, e.g., the

sheet material is not displaced by initial friction with either one of the fold rollers as the sheet material comes into contact with the fold rollers during a folding operation.

The foregoing features are broadly encompassed by Applicants' independent claims 1 and 14. These claims are directed to an apparatus for folding sheet material and a method for folding a sheet of material. As recited in claim 1, the apparatus for folding sheet material comprises, *inter alia*, a fold blade, two fold rollers, a pinch foot for clamping against the fold blade, and drive means for moving at least one of the fold blade and the fold rollers into operable communication with one another. Each of the fold rollers rotates about an axis parallel to a longitudinal axis of the fold blade. Claim 14 recites a method for folding a sheet of material comprises the steps of, *inter alia*, feeding a sheet material into an area between two fold rollers and a fold blade, clamping the sheet material against the fold blade with a pinch foot, and moving the fold rollers and the fold blade relative to one another to form a fold in the sheet using the fold blade, wherein the fold rollers rotate about an axis parallel to a longitudinal axis of the fold blade.

The *Nemec* patent discloses a gate folding apparatus having a folding table with a central opening and a pair of fold rolls located below the opening forming a nip. A vertically movable gate assembly with a blade is located parallel to the fold rolls. In operation, a sheet is conveyed over the opening and under the blade. The gate assembly is lowered and the blade engages the sheet in a crease zone and drives the sheet down between the nip formed in the fold rolls. The fold rolls rotate to draw the sheet material from the nip through the opening between the pair of fold rolls.

The Official Action states that *Nemec* does not disclose a pinch foot that clamps against the foot blade. The Examiner therefore relies upon the disclosure in commonly assigned *Trovinger et al.*

*Trovinger et al.* disclose a method and apparatus for assembling sheets of printing media for booklets. In an exemplary embodiment of figures 14-22, a fold mechanism 210 is shown as including a fold blade 217 and a pinch wheel assembly 231 with a pinch wheel 232. In operation, a paper drive assembly advances a sheet into the fold mechanism. Once positioned, the folder assembly 211 translates downward and the pinch wheels 322 capture the sheet 244 against the fold blade 217 to hold the sheet between the pinch wheels and the edge of the fold blade. The folder assembly 211 continues to translate downward and the fold flaps 230 start to contact the sheet 244. Downward motion of the folder assembly 211 continues until the V grooves 241 and fold rollers 238 have fully received the fold blade 217. Concurrently, the pinch wheel assemblies 231 move vertically relative to the folder assembly 211 on vertical shafts 235. Thereafter, the folder assembly 211 is moved transversely back and forth along a fold blade 217 by the horizontal drive motor assembly 220 to fully crease the sheet all along the length of the fold. The fold rollers 238 are spaced apart and travel a horizontal distance sufficient to ensure that every point along the edge of the fold is contacted and creased by at least one fold roller. See pages 21-25 of *Trovinger et al.* Thus, the pinch roller assembly 231 in this embodiment of *Trovinger et al.* first moves vertically while maintaining contact between the sheet material and the fold blade and then moves transversely with fold rollers 238 by the movement of the fold assembly 211. In this fashion, the entire length of the fold is creased.

One skilled in the art considering the disclosure contained in *Nemec* and the above described embodiment of *Trovinger et al.* would not have been motivated to modify the construction of the gate folding apparatus in *Nemec* to use of features of the disclosure in *Trovinger et al.* in the manner suggested by the Examiner because the two devices described in these documents operate in fundamentally different manners. As noted above, *Nemec* uses a gate folding apparatus to feed a sheet of material over an opening between two fold rolls. The fold blade then operates to push the sheet material through the fold rolls to form a crease. The fold rolls are positioned such that the axes about which the fold rolls rotate are parallel to the length of the fold.

In contrast, the embodiments of *Trovinger et al.* relied upon by the examiner and illustrated in Figures 14-22 roll a plurality of V-shaped fold rollers along the length of and against the fold blade to fold the sheet material. The fold rollers have axes of rotation perpendicular, not parallel, to the length of the fold in the sheet material. The pinch roller assembly 231 is used during the fold operation to translate along the length of the fold roller as the housing translates to place the fold in the sheet material. Thus, the pinch roller assembly 231 of *Trovinger et al.* is used because parallel rotating fold rollers and a fold blade are used to fold a sheet, while *Nemec* teaches away from the use of parallel rotating fold rolls and a fold blade to fold a sheet.

The fold blade of *Nemec et al.* is designed to contact the sheet material and force it through the fold rolls. As such, the fold blade is ultimately not in contact with the sheet during the fold and there would have been no need to include the pinch roller assembly 231 disclosed in *Trovinger et al.* Any use of a pinch roller assembly 231 of *Trovinger et al.*

would have been unnecessary and indeed contrary to the nip and pass through operation of the fold rolls disclosed in *Nemec*. One would not have been motivated to use a pinch roller assembly 231 of *Trovinger et al.* to maintain clamping contact between the sheet material and the fold blade because in *Nemec* the sheet material is removed from the fold blade to complete the fold. The positioning of the pinch roller assembly 231 of *Trovinger et al.* would destroy operation of the gate folding apparatus of *Nemec*. For at least these reasons, the proposed modification is improper and withdrawal of the rejection is respectfully requested.

Assuming for the sake of argument that some motivation would have existed for the combining of *Nemec* and *Trovinger et al.*, use of the noted features described in *Trovinger et al.* with the gate folding apparatus described in *Nemec* would not have resulted in an apparatus for folding sheet material recited in claim 1, nor would it have resulted in a method for folding a sheet material as recited in claim 14. In the Official Action, it is stated that *Nemec et al.* does not disclose a pinch foot that clamps against the fold blade. The Examiner thus relies upon *Trovinger et al.* for its disclosure of a pinch roller assembly and asserts that in combination with the disclosure in *Nemec*, the pinch roller assembly may be used for the purposes of increasing manufacturing efficiency.

However, *Trovinger et al.* discloses pinch roller assembly 231 positioned to maintain clamping pressure between a sheet material and the fold blade during translation along the length of the fold blade by the fold rollers. To provide the translation along the length of the fold blade, both the pinch roller of the pinch roller assembly and the fold rollers rotate about an axis perpendicular to the longitudinal axis of the fold blade. This

allows the forming of the fold by the fold rollers, and clamping by the pinch roller assembly during operation. To the contrary, in *Nemec*, the fold rolls rotate about an axis parallel to the longitudinal axis of the fold blade and there is no space for accommodating a pinch roll assembly clamping against the fold blade while placing the sheet material into the nip of the fold blades. Therefore, *Nemec* and *Trovinger et al.* alone or in combination, fail to teach or suggest providing an apparatus for folding sheet material as set forth in claim 1 and a method for folding a sheet of material as set forth in claim 14.

Thus, *Nemec* and *Trovinger et al.* would not have resulted in an apparatus for folding sheet material and a method for folding a sheet material having the claimed combination and arrangement of features. Therefore, Applicants respectfully request withdrawal of the rejection of claims 1, 2, 3, 5, 6-10, 13-16, and 19.

Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nemec* in view of *Trovinger et al.* and in further view of U.S. Patent No. 3,954,258 to Skipor et al. (hereafter "*Skipor et al.*") on the grounds set forth at paragraph 3 of the Official Action. Reconsideration of this rejection is respectfully requested.

*Skipor et al.* discloses a second fold roller mounting an adjustment means in which the fold rollers are pivotably biased toward each other. However, claims 11 and 12 depend from independent claim 1 and *Skipor et al.* does not disclose or address the above noted deficiencies in the disclosures of *Nemec* and *Trovinger et al.* Thus, dependent claims 11 and 12 are distinguishable over the combination of *Nemec*, *Trovinger et al.*, and *Skipor et al.*, alone or in combination, for at least the same reasons as discussed above.

Accordingly, withdrawal of the rejection is respectfully requested.

***NEW CLAIMS***

New claims 20-23 define further distinguishing characteristics associated with the claimed apparatus for folding sheet material and method for folding a sheet of material and are also allowable. Claim 20 recites that in the method, each of the fold rollers rotate about the axis in a first direction and a second direction. Claim 14 recites that the pinch foot retracts into a housing and maintains a pressure against the fold blade as the fold rollers and the fold blade move relative to one another and wherein the pinch foot is stationary with respect to a longitudinal axis of the fold blade. Claim 22 recites that in the apparatus of claim 1, each of the fold rollers rotate about the axis in a first direction and in a second direction. Claim 23 recites the pinch foot retracts into a housing and maintains a pressure against the fold blade as the fold rollers and the fold blade move relative to one another and wherein the pinch foot is stationary with respect to the longitudinal axis of the fold blade.

The gate folding apparatus of *Nemec* is quite different in that the fold rolls of *Nemec* each operate in a first direction to each of the rollers so as to draw the sheet material through the nip and through the fold rollers without reversing their direction of rotation. Further, *Trovinger et al.* is quite different in that the pinch roller assembly in *Trovinger et al.* is not stationary with respect to a longitudinal axis of the fold blade but rather is translated relative to the longitudinal axis of the fold blade by the housing during the folding operation. In addition, *Skipor et al.* is quite different in that folded products positioned into the nip are advanced through the folding nip (see column 2, lines 60-66) and



thus the rollers do not operate in both a first direction and a second direction. Claims 20-23 are therefore further distinguishable over the cited documents.

**CONCLUSION**

From the foregoing, all pending claims are considered allowable and further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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